

REMARKS

Status of Claims

Applicant respectfully requests reconsideration and allowance of all of the claims of the application. Claims 1-46 are presently pending. Claims 1, 2, 5-7, 10-13, 15-23, 27, 28, 32, 33, and 35-46 have been amended. No claims have been added, canceled or withdrawn. Claims 1, 12, 17, 20, 23, 33 and 38 are independent.

Statement of Substance of Interview

The Examiner graciously talked with me, the undersigned representative for the Applicant, on June 2, 2009. Applicant greatly appreciates the Examiner's willingness to talk. Such open communication is invaluable to both of us in our common goal of an expedited prosecution of this patent application.

During the interview, the objection to the specification was discussed, and I understood the Examiner to agree that the proposed amendment to the specification for adding the term "computer-readable storage media" to paragraph 0034 would be sufficient for overcoming the objection to the specification.

Also during the interview, the rejections of claims 23-37 under 35 USC § 101 were discussed, and I understood the Examiner to agree that the proposed amendments to independent claims 23 and 33 appeared to be sufficient for overcoming the rejections of claims 23-37 under 35 USC § 101.

Also during the interview, I discussed how the invention differed from the cited references, namely, Whiting and Tokunaga. Without conceding the propriety of the rejections and in the interest of expediting prosecution, I also proposed several possible

clarifying amendments. While no agreement was reached on whether the proposed amendments would overcome the art of record, Applicant greatly appreciates receiving the Examiner's perspective on the references and the claims.

Applicant herein amends the claims in a manner consistent with that discussed during the interview. Accordingly, Applicant submits that the pending claims are allowable over the cited art of record for at least the reasons discussed during the interview.

Claim Amendments

Without conceding the propriety of the rejections herein and in the interest of expediting prosecution, Applicant amends claims 1, 2, 5-7, 10-13, 15-23, 27, 28, 32, 33, and 35-46 herein. Applicant amends these claims to clarify the claimed features. Support for the amendments to the claims may be found in Applicant's specification, for example, at least at paragraphs 0084-0093, 0102, 0103 and FIG. 7 of the published application, US 20050210151. These amendments are merely intended to clarify the claimed features, and should not be construed as further limiting the claimed invention in response to the cited references.

Formal Matters

This section addresses any formal matters (e.g., objections) raised by the Examiner.

Objection to the Specification

The Office Action objects to the specification for failing to provide proper antecedent basis for the term "computer-readable media" included in original claims 11, 16, 22 and 38-46. Applicant has amended paragraph 0034, as shown above, to provide such antecedent basis in the specification and drawings. Further, as this term was used in the original claims of the application, as filed, and therefore forms part of the original disclosure, no new matter has been added by the amendments herein. In view of the amendments, Applicant respectfully requests that the objection be withdrawn.

Substantive Matters

Claim Rejections under § 101

Claims 23-37 are rejected under 35 USC § 101. Applicant respectfully traverses this rejection. Further, Applicant has amended these claims in the manner discussed during the interview. During the interview, I understood the Examiner to agree that the amendments appeared to overcome the rejection under 35 USC § 101. Accordingly, Applicant asks the Examiner to withdraw these rejections.

If the Examiner maintains the rejection of these claims, then Applicant requests additional guidance as to what is necessary to overcome the rejection.

Claim Rejections under § 102

The Office Action rejects claims 1-46 under § 102. For the reasons set forth below, Applicant respectfully requests that the § 102 rejections be withdrawn and the case be passed along to issuance.

The Office Action's rejections are based upon the following references alone or in combination:

- **Whiting:** *Whiting, et al.*, US Patent No. 5,146,221 (issued September 8, 1992) and;
- **Tokunaga:** *Tokunaga, et al.*, US Patent No. 5,968,132 (issued October 19, 1999).

Overview of the Application

The Application describes a technology for compression of streaming data. Some implementations include compressing data for communication in a terminal services environment by finding an index in a lookup table that matches an initial sequence in data. The lookup table includes a plurality of entries. Each of the entries is discoverable utilizing a particular one of a plurality of the indices. Each entry references whether a corresponding index is located in a history buffer, and if so, further references one or more locations of the corresponding index in the history buffer. If the corresponding entry of the matching index references a plurality of locations, for each location, a sequence having the matching index is compared with a sequence in the data that includes the initial sequence. A matching sequence is derived from the comparison based on a length and the location of the sequence at each of the locations. The matching sequence is represented using a representation that includes the length and the location of the matching sequence in the history buffer.

Cited References

The Office Action cites Whiting or Tokunaga as the primary reference in the anticipation-based rejections.

Whiting

Whiting describes a technology for converting an input data character stream into a variable length encoded data stream in a data compression system. The data compression system includes a history array. The history array has a plurality of entries

and each entry of the history array is for storing a portion of the input data stream. The method for converting the input data character stream includes performing a search in a history array for the longest data string which matches the input data string. If the matching data string is found within the history buffer, the next step includes encoding the longest matching data string found by appending to the encoded data stream a tag indicating the longest matching data string was found and a string substitution code. If the matching data string is not found within the history array, the next step includes encoding the first character of the input data string by appending to the encoded data stream a raw data tag indicating that no matching data string was found and the first character of the input data string.

Tokunaga

Tokunaga describes a technology for adjusting method in an image data communication system suitable for use when image data is transferred in a network environment. Image data is transferred in a most suitable quantity based on traffic of a network to avoid an effect on other services provided by the network. The apparatus has a data transmitting unit for transmitting image data to another image data communicating apparatus, a traffic detecting unit for detecting traffic of the network, and a communication data quantity adjusting unit for initially setting a transmittable number of image transferring frames on the basis of the detected traffic, and for automatically adjusting the quantity of data communication in the data transmitting unit on the basis of changing traffic on the network by altering the set number of frames.

102(b) Rejections Based upon Whiting or Tokunaga

The Office Action rejects claims 1-16 and 23-46 under 35 USC § 102(b) as being anticipated by Whiting. The Office Action rejects claims 17-22 under 35 USC § 102(b) as being anticipated by Tokunaga. Applicant respectfully traverses the rejection of these claims. Based on the reasons given below, Applicant asks the Examiner to withdraw the rejection of these claims.

Independent Claims 1, 12, 20, 23, 33 and 38

Applicant submits that Whiting does not anticipate at least the following elements as recited in amended independent claim 1 (with emphasis added):

...compressing the data at the first device by finding an index in a lookup table that matches an initial sequence in data, wherein:

the lookup table includes a plurality of entries, each said entry being discoverable utilizing a particular one of a plurality of said indices; and

each said entry references whether a corresponding said index is located in a history buffer, and if so, further references one or more locations of the corresponding said index in the history buffer; and

if the corresponding said entry of the matching index references a plurality of said locations:

for each said location, comparing a sequence at the location having the matching index with a sequence in the data, said sequence including the initial sequence;

deriving a matching sequence from the comparison based on at least one of a length and the location of the sequence at each said location; and

representing the matching sequence using a representation that includes the length and the location of the matching sequence in the history buffer;

forming compressed data that includes at least one of said representations;

further compressing the compressed data by encoding the at least one representation, wherein the at least one representation is encoded using a first Huffman table for encoding the length using Huffman encoding and using a last recently used (LRU) table for encoding the location of the matching sequence in the history buffer, wherein the LRU table lists a plurality of recently used locations of recent matching sequences, wherein, when the location of the matching sequence is not in the LRU table, the location of the matching sequence is encoded with Huffman encoding using a second Huffman table; and

streaming the compressed data over the network to the second device.

Whiting does not disclose ***further compressing the compressed data by encoding the at least one representation, wherein the at least one representation is encoded using a first Huffman table for encoding the length using Huffman encoding and using a last recently used (LRU) table for encoding the location of the matching sequence in the history buffer, wherein the LRU table lists a plurality of recently used locations of recent matching sequences, wherein, when the location of the matching sequence is not in the LRU table, the location of the matching sequence is encoded with Huffman encoding using a second Huffman table***, as recited in Applicant's claim 1. Instead, Whiting merely describes the following:

In the preferred embodiment, the offset encoding or the number of bytes back into the history buffer is one of two forms (23, FIG. 2). A short form having 7 bits can create an offset of 1 to 127 bytes and a long form having 11 bits can create an offset of 1 to 2,047 bytes. The long and short offset forms are differentiated by a single bit; "1" designating short form and "0" designating long form. The particular length encoding scheme used by the present invention is shown in Table 25 (FIG. 2). From the top of the Table 25, a 2 byte length is encoded by 2 bits having the values "00" (22, FIG. 2). Likewise, encoded lengths of 3 and 4 bytes

are represented respectively by 2 bits having the values "01" (24, FIG. 2) and "10" (26, FIG. 2). Byte lengths of 5 to 7 are represented by 4 bits, "11 00" to "11 10" (28-32, FIG. 2). Byte lengths of 8 to 22 are represented by 8 bits, "11 110000" to "11 11 1110" (34-62, FIG. 2). After 22 byte lengths, the next byte lengths between 23 and 37 are represented by 12 bits, (64-70, FIG. 2) and so on (col. 8, line 66 through col. 9, line 17).

Table 25 of FIG. 2 showing offset encoding 23 and string length encoding 25 is reproduced below:

FIG. 2.

19 ~ 0 b b b b b b b b = unencoded ("raw") 8-bit byte b b b b b b b b

21 ~ 1 <offset> <length> = string at offset back into history of given length

23 ~ Offset encoding (# bytes back into history from current position):
 <offset> = 1 0 0 0 0 0 0 0 = 7-bit (short) offset 1..127 bytes
 0 0 0 0 0 0 0 0 0 0 0 0 = 11-bit (long) offset 1..2047 bytes

25 ~ String length encoding table:

<length> = 00	• 2 bytes - 22
01	• 3 bytes - 24
10	• 4 bytes - 26
11 00	• 5 bytes - 28
11 01	• 6 bytes - 30
11 10	• 7 bytes - 32
11 11 0000	• 8 bytes - 34
11 11 0001	• 9 bytes - 36
11 11 0010	• 10 bytes - 38
11 11 0011	• 11 bytes - 40
11 11 0100	• 12 bytes - 42
11 11 0101	• 13 bytes - 44
11 11 0110	• 14 bytes - 46
11 11 0111	• 15 bytes - 48
11 11 1000	• 16 bytes - 50
11 11 1001	• 17 bytes - 52
11 11 1010	• 18 bytes - 54
11 11 1011	• 19 bytes - 56
11 11 1100	• 20 bytes - 58
11 11 1101	• 21 bytes - 60
11 11 1110	• 22 bytes - 62
11 11 1111 0000	• 23 bytes - 64
11 11 1111 0001	• 24 bytes - 66
11 11 1111 0010	• 25 bytes - 68
...	...
11 11 1111 1110	• 37 bytes - 70
11 11 1111 1111 0000	• 38 bytes - 72
11 11 1111 1111 0001	• 39 bytes - 74
etc.	

Consequently, Whiting describes that the length and relative position of a string is encoded using either short or long forms (col. 8, line 66 through col. 9, line 17). Thus, Whiting does not disclose, teach or suggest ***further compressing the compressed data by encoding the at least one representation, wherein the at least one representation is encoded using a first Huffman table for encoding the length using Huffman encoding and using a last recently used (LRU) table for encoding the location of the matching sequence in the history buffer, wherein the LRU table lists a plurality of recently used locations of recent matching sequences, wherein, when the location of the matching sequence is not in the LRU table, the location of the matching sequence is encoded with Huffman encoding using a second Huffman table***, as recited in Applicant's claim 1.

Additionally, Whiting's description of Huffman encoding and MacCriskin also fails to disclose these limitations. For example, Whiting describes MacCriskin as dynamically switching back and forth between two compression methods (col. 4, lines 50-58). In addition to Huffman encoding, MacCriskin uses a secondary string-based compression method (col. 5, lines 13-14). If a string is found, a special Huffman escape code is generated and the length and the offset of the string in the history buffer is sent (col. 5, lines 23-26). However, Whiting's description of MacCriskin does not disclose ***further compressing the compressed data by encoding the at least one representation, wherein the at least one representation is encoded using a first Huffman table for encoding the length using Huffman encoding and using a last recently used (LRU) table for encoding the location of the matching sequence in the history buffer, wherein the LRU table lists a plurality of recently used***

locations of recent matching sequences, wherein, when the location of the matching sequence is not in the LRU table, the location of the matching sequence is encoded with Huffman encoding using a second Huffman table, as recited in Applicant's claim 1.

Tokunaga and the other art of record fail to make up for the shortcomings in Whiting discussed above. Accordingly, Applicant respectfully submits that claim 1 is allowable over Whiting, Tokunaga and/or the other art of record, and is in condition for allowance. Applicant respectfully asks the Examiner to withdraw the rejection of claim 1.

Independent claims 12, 20, 23, 33 and 38 include limitations similar to those discussed above with respect to claim 1, are allowable under a similar rationale, and thus, are also in condition for allowance.

Independent Claim 17

Applicant submits that Tokunaga does not anticipate at least the following elements as recited in amended independent claim 17 (with emphasis added):

...adding data to a history buffer at the first device for compression;

updating a lookup table that references the history buffer to include the added data, wherein:

the lookup table includes a plurality of entries, each said entry being discoverable utilizing a particular one of a plurality of indices; and

each said entry references whether a corresponding said index is located in the history buffer, and if so, further references one or

more locations of the corresponding said index in the history buffer;

starting a current pointer at the added data in the history buffer;

finding one said index in the lookup table that matches an initial sequence at the current pointer;

if the corresponding said entry of the matching index references a plurality of said locations:

comparing a sequence at each said location having the matching index with a sequence in the added data that includes the initial sequence;

deriving a matching sequence from the comparison;

representing the matching sequence with a representation that includes the location and a length of the matching sequence in the history buffer;

forming compressed from the packet of data that includes the representation;

advancing the current pointer by the length of the matching sequence;

when the current pointer has advanced through the packet of data, packetizing the compressed data for streaming;

streaming the packetized compressed data over the network to the second device;

receiving feedback that indicates availability of resources for communicating the packetized compressed data over the network from the first device to the second device; and

tuning one or more parameters of the compression process utilized to compress the packetized compressed data in response to the feedback, wherein the tuning comprises increasing a size of a search window used for sequence matching in the compression process when the feedback indicates that the compressed data is being transmitted over the network at a lower than expected rate.

Tokunaga does not disclose ***tuning one or more parameters of the compression process utilized to compress the packetized compressed data in response to the feedback, wherein the tuning comprises increasing a size of a search window used for sequence matching in the compression process when the feedback indicates that the compressed data is being transmitted over the network at a lower than expected rate***, as recited in Applicant's claim 17. Instead, at column 3, lines 23-40, Tokunaga merely describes the following:

The image data communicating apparatus 1a may have a first image data compressing unit for compressing image data that should be transmitted. In addition, the image data communicating apparatus may further have a compression parameter controlling unit for variably controlling a compression parameter by the first image data compressing unit so as to bring the number of frames close to the number of frames initially set by the communication data quantity adjusting unit 4 if the traffic detecting unit 3 judges that image data cannot be transferred in an initial quantity of communication data.

Further, the above compression parameter controlling unit may have a table in which a compression parameter used by the first image data compressing unit for a change in traffic is stored to variably control the compression parameter by referring to the table on the basis of a change in traffic detected by the traffic detecting unit 3.

From the foregoing, it is apparent that Tokunaga merely describes a compression parameter controlling unit for variably controlling a compression parameter (col. 3, lines 27-29). Consequently, Tokunaga does not disclose, teach or suggest ***tuning one or more parameters of the compression process utilized to compress the packetized compressed data in response to the feedback, wherein the tuning comprises increasing a size of a search window used for sequence matching in the compression process when the feedback indicates that the compressed data***

is being transmitted over the network at a lower than expected rate, as recited in Applicant's claim 17.

Whiting and the other art of record fail to make up for the shortcomings in Tokunaga discussed above. Accordingly, Applicant respectfully submits that claim 17 is allowable over Tokunaga, Whiting and/or the other art of record, and is in condition for allowance. Applicant respectfully asks the Examiner to withdraw the rejection of claim 17.

Dependent Claims

In addition to its own merits, each dependent claim is allowable for the same reasons that its base claim is allowable. Applicant requests that the Examiner withdraw the rejection of each dependent claim where its base claim is allowable.

Further, some or all of these claims are separately patentable over the art of record. For example, claim 5 includes *streaming the compressed data over a network, wherein the data is formatted as one or more packets and the packets are compressed for transmission over the network so that the compressing is performed on a per-packet basis*. On the other hand, neither Whiting, nor Tokunaga disclose, teach or suggest compression performed on a per-packet basis, or streaming compressed data over a network. Accordingly, dependent claim 5 is separately patentable over the art of record for this aspect. Dependent claim 27 includes similar limitations, and is also patentable over the art of record.

Additionally, dependent claim 6 includes *using the second Huffman table to also compress literal sequences that have no matching index in the history*

buffer, and streaming the compressed literal sequences to the second device. As discussed above with respect to claim 1, Whiting discusses that Huffman encoding may be used for some compression applications (see, e.g., col. 2, line 32, through col. 3, line 22). However, neither Whiting, nor the other art of record discloses, teaches, or suggests using a second Huffman table that is also used to compress locations of matching sequences for compressing literal sequences that have no matching index in the history buffer. Accordingly, dependent claim 6 is separately patentable over the art of record for this aspect. Dependent claims 13, 28 and 39 include similar limitations, and are also patentable over the art of record.

Conclusion

All pending claims are in condition for allowance. Applicant respectfully requests reconsideration and prompt issuance of the application. If any issues remain that prevent issuance of this application, the **Examiner is urged to contact me before issuing a subsequent Action.** Please call or email me at your convenience.

Respectfully Submitted,

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/Colin D. Barnitz/

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